

1     **WHAT IS CLAIMED IS:**

2             1. A rapid cycle pressure swing adsorption oxygen concentration  
3     method comprising:

4             (a) preparing a mechanical valve comprising at least one cam-actuated  
5     flow control valve and a valve actuator having a rotating shaft and a cam  
6     corresponding to each respective one of the at least one cam-actuated flow  
7     control valve;

8             (b) interconnecting the cam with the rotating shaft;

9             (c) preparing a sieve tank having at least one molecular sieve bed filled  
10    with molecular sieve materials;

11            (d) mounting the mechanical valve on the sieve tank to make the at least  
12    one cam-actuated flow control valve selectively switch an airflow direction of  
13    air for the at least one molecular sieve bed as the at least one cam-actuated flow  
14    control valve is actuated;

15            (e) rotating the rotating shaft thereby the cam actuates the corresponding  
16    one of the at least one cam-actuated flow control valve; and

17            (f) separating oxygen from the air incoming into the at least one sieve  
18    bed.

19            2. The method as claimed in claim 1, wherein the at least one cam-  
20    actuated flow control valve is a 2-position, 2-way air pilot directional flow  
21    control valve.

22            3. A rapid cycle pressure swing adsorption oxygen concentrator  
23    comprising

24            a sieve tank having

1                   a first molecular sieve bed filled with molecular sieve materials;  
2                   a second molecular sieve bed filled with molecular sieve materials;  
3    and  
4                   an oxygen storage bed communicating with both the first and the  
5    second molecular sieve beds and having a concentrated oxygen outlet tubing;  
6    and  
7                   a mechanical valve mounted on the sieve tank and comprising  
8                   a mounting bracket mounted on the sieve tank and having an inner  
9    space, an intake air entrance adapted to connect to a compressed air source and  
10   an exhausting exit;  
11                  a valve actuator mounted on the mounting bracket and comprising  
12                          a motor mounted on the mounting bracket;  
13                          a rotating shaft mounted in the inner space of the  
14   mounting bracket and being rotated by the motor;  
15                          five cams mounted on the rotating shaft and rotated by  
16   the rotating shaft; and  
17                          five cam-actuated valves mounted in the inner space of  
18   the mounting bracket, corresponding respectively to the five cams and  
19   comprising a first valve interconnecting the first molecular sieve bed with the  
20   exhausting exit, a second valve interconnecting the intake air entrance with the  
21   first molecular sieve bed, a third valve interconnecting the first molecular sieve  
22   bed with the second molecular sieve bed, a fourth valve interconnecting the  
23   intake air entrance with the second molecular sieve bed and a fifth valve  
24   interconnecting the second molecular sieve bed with the exhausting exit.

1           4. The rapid cycle pressure swing adsorption oxygen concentrator as  
2       claimed in claim 3, wherein the motor is a stepper motor.

3           5. The rapid cycle pressure swing adsorption oxygen concentrator as  
4       claimed in claim 4, wherein each of the cam-actuated flow control valves is a  
5       2-position, 2-way air pilot directional control valve.

6           6. The rapid cycle pressure swing adsorption oxygen concentrator as  
7       claimed in claim 5, wherein the valve actuator further comprises a covering  
8       housing mounted on the mounting bracket to enclose the inner space.